



B I O M E

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Canada's Vanishing Wetlands: Their Future is in Your Hands



Great Blue Heron

environments. Marshes are composed of cattails and other emergent and floating plants, and experience fluctuating water levels and flooding.

Swamps are wooded wetlands, and are usually found along rivers and streams. They are characterized by trees such as red and silver maple, black ash and white cedar, as well as a variety of shrubs.

Bogs are acidic, nutrient-poor wetlands, most often found in northern environments. They usually have small areas of open water and an underlying deep layer of peat. Bogs often support stands of trees such as black spruce and tamarack.

Fens are peat-forming wetlands that have developed in areas of calcareous bedrock. Fens have a predominance of sedges but they may also be rich in other herbaceous plants. They often contain scattered trees such as white cedar or tamarack, and specialized plants such as orchids.

Why are wetlands important?

Many experts consider marshes the most productive of all the world's ecosystems, using the dry weight of plant material produced per square metre per year to measure productivity. Marsh productivity is in fact two or three times greater than that of a hay or wheat field. Wetlands provide essential habitats for wildlife: 204 of Canada's 578 bird species, 50 mammal species and various other plant and animal species depend partially or entirely on wetlands for their survival. The whooping crane, the Acadian whitefish, the wood bison and the white lady's slipper are just some of the 42 rare or endangered species that depend on wetlands for survival.

Wetlands have various important hydrologic functions. During heavy runoff, they reduce downstream flooding by providing retention areas. The economic value of this alone is estimated at several

Otter

hundred dollars per hectare each year. Conversely, during a drought, wetlands release stored water, helping to maintain stream flows and groundwater tables. Shoreline wetlands control erosion — their vegetation absorbs wave energy and their root systems stabilize banks during storms or heavy runoff. Wetlands vegetation slows water flow, giving sediment, nutrients, heavy metals and other suspended pollutants time to settle and become trapped in the bottom sediment or absorbed by plants. This process, called silt retention, benefits society in many ways: it reduces silting of downstream dams, it ensures the quality of downstream water for recreational use, and it reduces the cost of municipal water filtration systems. Bacteria living in wetlands convert excess nitrates into nitrogen, which is released harmlessly into the air, thereby reducing algal blooms.

Wetlands are important research and educational tools. They are benchmarks to compare with the surrounding man-altered landscape, and provide "living" classrooms for all ages. They offer many opportunities for hunting, fishing, birdwatching, canoeing, photography and other forms of nature interpretation, which may boost local tourism.

Wetlands are also early warning systems for the environmental health of communities when their biological components are monitored to assess levels of toxicity. Wetlands support the harvest of many natural resources, including timber, wild rice, cranberries, fish, fur-bearing animals, peat and sphagnum moss. In Ontario alone such harvests annually contribute more than \$300 million to the economy.



What is happening to wetlands?

As population and development increase in Canada, wetlands are disappearing. Although wetlands conversion is often beneficial, it has not been without cost. When wetlands are drained or filled, they lose their natural ability to provide pollution, flood and water quality control, and society loses their recreational and economic benefits. Wildlife disappears and the landscape becomes less interesting.

However, not all wetlands should be saved. Sometimes wetlands conversion is necessary and can be very productive. The problem is that wetlands conversion has not been regulated to ensure a viable wetlands resource base for the future. In many cases wetlands conversion is encouraged or subsidized to satisfy the agricultural, industrial, urban and recreational land-use demands of a rapidly growing population. But like all other natural resources, wetlands must be wisely managed if Canada is to build a sustainable future.

Although the loss of wetlands has received far less attention than the destruction of tropical rain forests, experts believe protecting wetlands is as important as protecting rain forests. Wetlands provide critical habitats for wildlife and preserve genetic diversity. Wetlands conservation is an important issue in Canada and around the world.

Since the beginning of European settlement it is estimated that we have lost 65% of Canada's Atlantic coastal fresh- and saltwater marshes, 70% of southern Ontario and Quebec wetlands, up to 71% of prairie wetlands and 80% of the Fraser River delta wetlands. In southern Canada it is estimated that more than one-half of the original wetlands have been lost; in southwestern Ontario it may be as much as 90%. Around Montreal, Toronto, Windsor, Winnipeg, Regina, Saskatoon and Edmonton, 80% of the wetlands are gone and those that are left are under constant siege. Conversion for agricultural development has been responsible for 85% of this loss; urban, industrial and recreational development share responsibility for the other 15%. Only about 1.27 million square km of wetlands (about 14% of Canada) remain. They are largely bogs and fens and are generally in northern Canada.

(continued on page 4)

Through the ages society has regarded wetlands with a mixture of suspicion, disdain and fear. Myth and legend have contributed to this view by traditionally depicting wetlands as dark, evil, foreboding places, haunted by demons and other dreadful creatures. It is not surprising that wetlands are generally considered to have little value until they are converted to some "productive" use.

Canada's history has contributed to society's negative view of wetlands. Canada once abounded in wetlands, which posed formidable obstacles to settlement and often caused personal hardship. One story tells the tale of an early surveyor assigned to survey some of the swamper areas of Ontario. He became so frustrated by what appeared to be endless and impenetrable wetlands that he returned to Toronto and threatened to quit. It was only after being promised that he could name all the townships he surveyed that he returned to the field. After finishing his survey he took great pleasure in naming the swampiest townships after people he hated!

It is unfortunate that wetlands are generally viewed as liabilities, because they really are tremendous

assets. Wetlands are natural treasure chests waiting to be unlocked. Rather than continuing to plunder and destroy them, society could, through understanding and protection, secure the key to these treasure chests, and at little cost reap their many benefits forever.

The key is to first learn what wetlands are and why they are so important, then to develop and implement new directions in land-use planning and integrated resources management, so that wetlands remain a viable part of the Canadian landscape for future generations.

What are wetlands?

Wetlands are areas where land and water meet, creating transition zones between the terrestrial and aquatic environments. Permanently or periodically, wetlands are covered with water up to two metres deep, and support a wide variety of plants and animals that have adapted to life in a wet environment. Four major types of wetlands are found in Canada: marshes, swamps, bogs and fens.

Marshes are what most people associate with the word wetlands. They are found along the shallow edges of lakes, bays, ponds and rivers, in both salt- and freshwater

Photographing Flowers

The photography of flowers, whether they are wild flowers from the surrounding countryside or the cultivated variety in your garden, may not only be an enjoyable and rewarding experience, but can provide a first-hand introduction to one of nature's most beautiful and intricate offerings.

Although most cameras may be used to capture flowers on film, serious photographers will use an SLR or "single-lens-reflex" camera with lenses built specifically for close-up work. However, this should not discourage would-be nature lovers from experimenting with their "instamatic" or viewfinder cameras.

The results of your photography will depend on several factors, including the subject itself, your time and patience, and of course, practice. Most flowers, whether large or small, offer the photographer a chance to be an artist, a chance to create something special.



Fragrant water-lily

Of prime importance is the selection of film type. A faster film speed or ASA/ISO rating will allow you to use faster shutter speeds, thereby avoiding blurred pictures caused by the wavering of flowers in even the slightest of breezes. Professionals use films rated at an ASA/ISO of 100. Slower films may require the

use of a flash fill-in and tripod. Faster films with ratings more than 100 often result in a duller more "grainy" image.

The subject itself may be a group of flowers within your garden or a single smaller flower found along a stream bank or poking through the leaf litter in a wooded area. Again, patience will be the key in providing that special photo. Look carefully at the flower, noting its best "profile." Get close to the flower and determine the overall best angle. Don't be fooled into thinking that bright sunlight is necessary for beautiful results. Slightly overcast days have proven to provide the softer, more detailed photos, free of sharp shadows that distract the eye.

Be careful of the background too. Cluttered or "noisy" backgrounds will only cause interference and confusion to the viewer. Experiment with f-stops, the size of your lens opening, which determines the overall clarity or "depth of field" of your final picture. A smaller f-stop will open your lens aperture, blurring the "noisy" background. A larger f-stop will close down your lens aperture, bringing more objects into sharper detail.

As you progress and become familiar with a variety of wild or



Flowering rush



Black-eyed Susans

cultivated flowers you may want to learn more about the plant itself. Several good field guides are available at a moderate price and provide information about the range of the plant, the flowering and fruiting periods, and of course photographs or drawings to assist in identification. The Peterson and Audubon series are two excellent sources for the identification of wild flowers. Numerous gardening and horticulture books are also available for the identification of garden or house plants. Photography maga-

zines, such as *Outdoor Photographer*, often include articles on the photography of wild flowers.

With patience and practice you will eventually become more familiar with the capabilities and perhaps limitations of your camera. Soon you may want to experiment with the use of special close-up lenses or colour filters to soften or enhance nature's colours. Try back-lighting your subject. Place the sun or bright sky behind your subject, being sure to select the proper exposure time and f-stop (often only trial and error can determine this). The results of backlit photography can create a fringing of your flower in a soft, gentle glow — outlining your subject in sharp contrast. Professionals frequently "bracket" their shots. That is they take a photo at the "normal" or suggested exposure and then intentionally overexpose or underexpose by half an f-stop. These bracketed shots sometimes provide a better overall effect than "normal" exposures.

Don't be put off by inclement weather. Rain and snow can often provide interesting special effects and moods in your photographs. Above all else, your photographic forays should be enjoyable and an opportunity to learn something of our natural world. As all concerned naturalists, nature photographers should not harm the environment in their pursuit of the perfect photo. Practise care while walking through the woods. Avoid tramping on delicate spring blossoms and never pick flowers solely for enjoyment. Leave natural areas as you found them so others may enjoy their beauty as well.



Regent of Fiji

From the Director's Desk

I have a deeply perplexing question and I need your help to answer it.

Nature museums like ours look back in time to the very origins of the universe. Our collections are a record of the changes that have occurred. They have material in them that was collected hundreds of years ago. In my research, my hands have touched specimens that Darwin collected. I know his fingers were placed exactly where mine went. In fact, I have handled specimens his scientific ancestors collected more than a hundred years before he was born. These specimens are truly the ancient and venerable standards of science. From them we can reconstruct the past history of our world, and in some cases, of the universe.

Nature museums like ours also study and record the present. The collections provide a baseline of information about today's animals, plants and the very earth and rocks on which we stand. These specimens contain a small portion of our environment — stomach contents, body fluids, trace elements like mercury, isotope balances unique to our time, and many other delicate and often hidden sources of information. By the nature of the information collected with them, they tell scientists about the ecological and behavioral interrelationships among plants and animals. Mankind's understanding of the world is preserved in these collections for those who have the knowledge and patience to tease it out.

The great scientists of the world did not, and do not, toil and struggle with these secrets merely to see what the world was like, or even to record what the world is like today. By them-

selves, these are sterile subjects, about as intellectually tantalizing as a complex jigsaw puzzle. Once a puzzle has been completed, it is of little further interest. So too, the record of the earth and its past, once completed, will be of little further interest.

The real reason scientists work with such dedication is that they can see into the future. To most people, the future is dark and mysterious. Mystics may see the future, but they never translate their visions into words we ordinary folk can understand. Unlike mystics, scientists can predict the future and can define the probability that their predictions will be correct. This profound understanding of our world can and often has caused great conflict. Changing our view of reality is deeply disturbing, and yet this is the stuff of science. Darwin's hands and mind touched the specimens; his intellectual insight, now scientifically unassailable, still has thousands of people deeply troubled because it denies their previous view of reality.

Today the world's environment is threatened by man's capacity for unlimited growth, technological exploitation of natural resources, and toxic wastes. Our museum scientists can and do look into the future. Our exhibit experts can translate the scientist's view of the future for us. It will challenge our minds to follow their logic; it will challenge our modern ethics and morals; it will be deeply disturbing.

Do you want to see that view of the future?

Alan R. Emery
Director

David M. Jarzen
Paleobiology Division

Ginseng, the Root of Good Health: Threatened in Canada

Most filled the clearings in a remote mountain forest one September dawn several thousand years ago. A Chinese peasant groped through the underbrush searching for a favourite herb to make a cough remedy for her sick children. Ahead, a cluster of strange red berries lit by a shaft of sunlight caught her eye. She examined this new plant closely noting that its three leafstalks arose from a common point at the top of the stem and that five leaflets radiated from the ends of each stalk. The stem supporting the berries arched upward from the center of attachment of leaves to the stem.

She carefully dug up the root from the rich forest soil. In astonishment, she let out a muffled cry when she realized that the gnarled whitish root looked like a human form. Excitedly, she hurried back to the village with her precious find. According to her beliefs, she had found a herb that would cure all human illnesses. Ancient beliefs in the doctrine of signatures held that plant parts shaped like a human organ would cure the ills of that organ. Perhaps from such an early chance find began the long-honoured Asian use and belief in the magical and therapeutic properties of ginseng, the man root (*Panax ginseng*).

In North America, Dr. Michel Sarrazin, the king's physician at Quebec, may have been the first European to discover and collect ginseng for science at the end of the 17th century. However, it was the French Jesuit Father Lafitau who established it as a trade commodity. Father Lafitau who was stationed in a mission near Montreal, learned of the Asian ginseng in 1714 in a letter from Father Jartoux, a colleague in China on a geographic survey for the emperor. Father Jartoux believed that this valuable and highly sought-after plant in China could also be found in the similar temperate forests of eastern North America. The next year, after much searching of the neighbouring forests, Father Lafitau found a plant of the North American ginseng (*Panax quinquefolium*), a species very similar to the Asian. To his surprise, he learned from the local Iroquois that the plant was a common medicinal herb.

What is in this sacred root that once was reserved only for emperors and was worth more than its weight in gold? When Carolus Linnaeus, the Swedish doctor and renowned naturalist, named the American ginseng in 1753, he knew about the plant's medicinal virtues. He placed this new species in the genus *Panax*, meaning all-healing, with other members of the Aralia family. *Panax ginseng*, the most valued of the Asian ginseng species, was not officially described until almost 100 years later. It was another 100 years before modern analysis identified the active principles in ginseng roots. Although a handful of sugar-containing saponins (ginsenosides) have been isolated, the various effects they have

on different parts of the body are still not fully understood.

Ginseng was used traditionally as an elixir for various ailments, including insomnia, gastritis, nervous disorders, anemia and diabetes. It was also thought to prolong life. Medical evidence indicates that ginseng extracts stimulate the nervous system, increase blood pressure, influence the endocrine glands and speed up metabolism. Also, because they are adaptogens — agents that help the body cope with stress and recover faster after strenuous exertion — they have become popular with some athletes.

By 1718 the lucrative ginseng trade between New France and China was established, operating through the merchants of the French Company of the Indies. Tonnes of dried ginseng root were sent to China and became the second most important trade commodity after furs. This extensive trade seriously depleted local ginseng populations. In 1751, native diggers, mainly Iroquois, began collecting roots with even greater zeal because of the increased demand by the Chinese and the high price paid to diggers. This led to indiscriminant collection of young plants and plants whose berries had not yet ripened. That year Chinese merchants refused the large shipment of small and poor quality roots. Canadian trade in ginseng stopped shortly after. Following the American Revolution, traders in the United States, recognizing the value of ginseng as a commodity, established independent trade with China based on the export of quality roots.

The continued harvesting and export of the root, particularly in the United States, raised concerns that North American ginseng would be eradicated, thereby eliminating a valuable trade commodity. In the mid 1800s, as much as about 300 tonnes of wild roots per year — representing between 6 million and 10 million plants — were

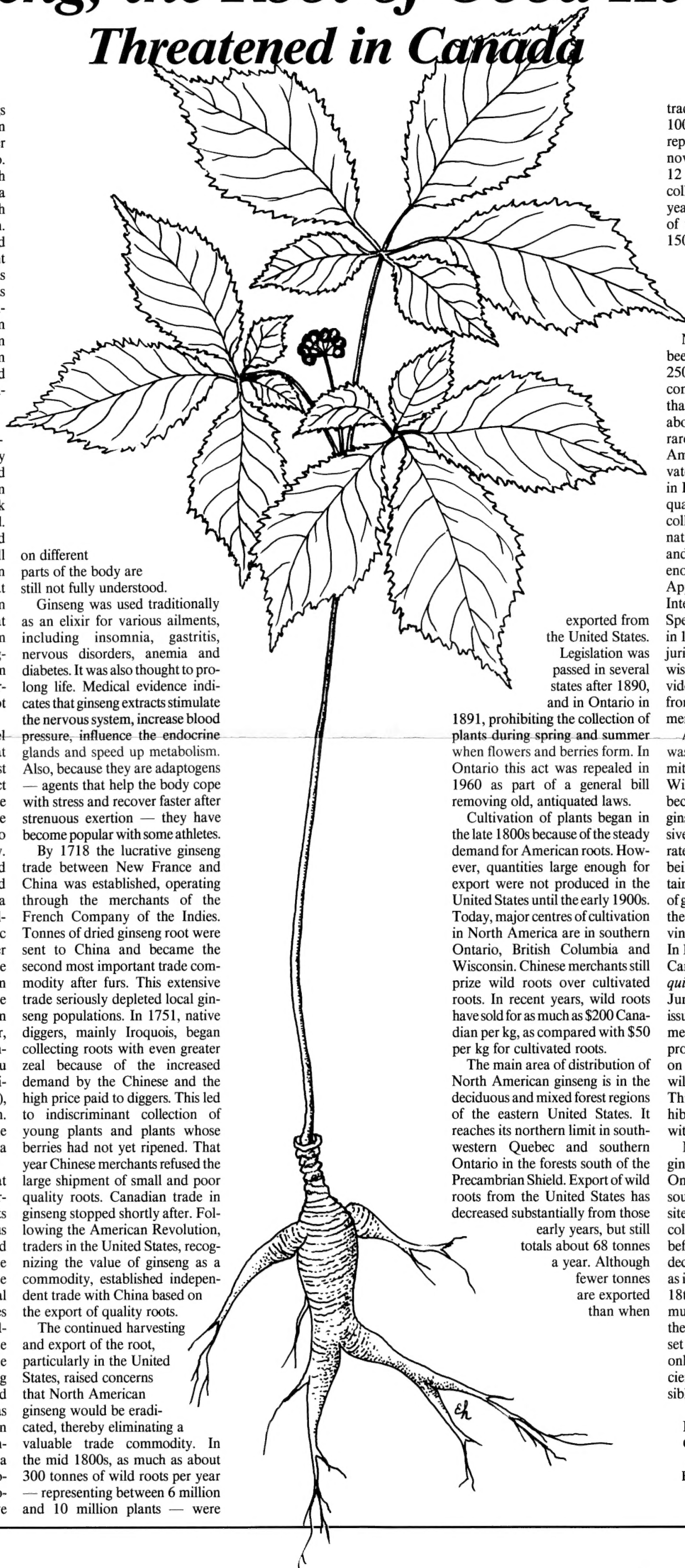
trade was at its height more than 100 years ago, the tonnes today represent more plants because roots now tend to be smaller. More than 12 million wild ginseng plants are collected in the United States every year. Recent Canadian exports of wild roots have totaled about 150 kg per year, exclusively from Ontario. Using an average root weight of about 3.5 g, more than 40,000 ginseng roots were harvested every year for international trade.

North American ginseng has been exploited for more than 250 years. This is a short period compared with the Asian species that has been used traditionally for about 5000 years. Asian ginseng is rarer in the wild than the North American species, but it is cultivated on a large scale, particularly in Korea. However, because large quantities of American ginseng are collected from the wild for international trade, wildlife managers and biologists became concerned enough to include the species on Appendix II of the Convention on International Trade in Endangered Species (CITES), a treaty ratified in 1973. Because of this listing, any jurisdiction of a signatory country wishing to export ginseng must provide documentation that exporting from the area will not be detrimental to the species' survival.

A study of Canadian ginseng was prepared in 1987 for the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) because of concerns that Ontario ginseng was being harvested excessively. The report indicated that the rate at which wild ginseng root was being exported could not be sustained. This was based on estimates of ginseng population numbers and their sizes in Ontario, the only province then issuing export permits. In 1988 COSEWIC designated the Canadian populations of *Panax quinquefolium* as threatened. In June 1989, the province stopped issuing export permits as an interim measure until further studies could provide more precise information on the threat posed by collecting wild roots for international trade. This ban on export does not prohibit collecting and using ginseng within the country.

Many scattered populations of ginseng still exist in southern Ontario, and to a lesser extent in southwestern Quebec, but most sites have few plants. Overzealous collection and removal of plants before seed is produced may again decimate the Canadian populations as it did in New France in the early 18th century. Wildlife managers must now determine the extent of the threat to ginseng in Canada and set guidelines for its harvest, but only if numbers of plants are sufficient to permit renewed, but possibly restricted, international trade.

Erich Haber
Chairman, Subcommittee for
Plants (COSEWIC)
Botany Division



exported from the United States.

Legislation was passed in several states after 1890, and in Ontario in

1891, prohibiting the collection of plants during spring and summer when flowers and berries form. In Ontario this act was repealed in 1960 as part of a general bill removing old, antiquated laws.

Cultivation of plants began in the late 1800s because of the steady demand for American roots. However, quantities large enough for export were not produced in the United States until the early 1900s. Today, major centres of cultivation in North America are in southern Ontario, British Columbia and Wisconsin. Chinese merchants still prize wild roots over cultivated roots. In recent years, wild roots have sold for as much as \$200 Canadian per kg, as compared with \$50 per kg for cultivated roots.

The main area of distribution of North American ginseng is in the deciduous and mixed forest regions of the eastern United States. It reaches its northern limit in southwestern Quebec and southern Ontario in the forests south of the Precambrian Shield. Export of wild roots from the United States has decreased substantially from those

early years, but still totals about 68 tonnes a year. Although fewer tonnes are exported than when

The quest for more knowledge about the dinosaurian world continued in July 1989 with an expedition to the Canadian High Arctic Islands, led by Dr. Dale Russell of the Museum's Paleobiology Division. Fellow dinosaur specialists Dr. Dong Zhiming (Chinese Academy of Sciences) and Dr. Philip Currie (Tyrrell Museum of Paleontology in Alberta) accompanied Dr. Russell. These field investigations were part of the Dinosaur Project, an ongoing research programme that has brought together dinosaur experts from Canada and China (see *BIOME* Vol. 7:3).

Since 1986, scientists have explored for the fossils of these ancient reptiles and associated fauna in the deserts of northwest China and Inner Mongolia, the badlands of Alberta and the Canadian Arctic. Discoveries have increased our knowledge about dinosaurs on both continents.

The 1989 Arctic expedition first focussed on the south coast of Bylot Island, a 30-minute helicopter ride across Eclipse Sound from the Inuit community of Pond Inlet on northern Baffin Island.

Dinosaur remains had been discovered in northern Alaska, the Yukon and mainland North-West Territories, but until 1987 expeditions to the High Arctic Islands were unsuccessful. That summer, Joshua Enookalook, an Inuit from Pond Inlet working as an assistant to a geological field party from Newfoundland's Memorial University, found a toe bone of a juvenile duckbilled (hadrosaur) dinosaur. This fossil — between 70 million and 75 million years old — (Late Cretaceous period) was discovered

Polar Dinosaurs

in a narrow and steep valley on Bylot Island, now informally called Dinosaur Valley. When he examined this bone, Dr. Russell estimated the juvenile was about 5 m long and weighed between 400 kg and 500 kg. Adult duckbills could measure 10 m and weigh two to three tonnes.

In the summer of 1988, a NMNS scientific party found more remains of plant-eating duckbill dinosaurs, along with the teeth of small predatory dinosaurs. Also found were several kinds of sharks, other freshwater and saltwater fish, and the partial remains of long-necked marine reptiles (plesiosaurs) and marine lizards (mosasaurs).

The 1989 Dinosaur Project expedition at Bylot made more discoveries, including a partial specimen of *Hesperornis*, one of the earliest Cretaceous birds. *Hesperornis* is a relatively common fossil in western North America, but this was the first recorded find in eastern North America. This flightless, toothed marine bird was similar in appearance and habits to modern grebes and loons, although it was much larger. It reached a length of 1.5 m!

The second leg of the 1989 expedition led north to the Bay Fiord area of western central Ellesmere Island. This time the team members had a useful clue. Mr. Randal Oscewski, an arctic historian who

accompanied the expedition team, had uncovered a report of the 1926 discovery of skeletal remains by Nookapingwa, a Greenland Inuit hunter and guide who served with some of the early long-distance RCMP patrols in the High Arctic. Unfortunately, the skeleton was not collected, but the archival report led the expedition team to the right area, where they recovered many remains of marine reptiles, the plesiosaurs and mosasaurs. It was the first time Upper Cretaceous mosasaurs had been found that far north. Other fragmentary bones collected may be plant-eating dinosaurs.

Polar dinosaurs are difficult to imagine, however 70 million years ago the Arctic was vastly different from today. During the late Cretaceous, eastern North America was separated from western North America by a vast inland sea. The land mass of the Arctic was then greater, and no large marine straits separated the islands as they do now. Without large bodies of cold water, what is now the Arctic Archipelago had a more temperate and moderate climate, and more moisture. It was still the "land of the midnight sun," but without ice or snow. The climate was subtropical to temperate, much like southern Vancouver Island. The constant, round-the-clock sunlight



A polar dinosaur: *Hypacrosaurus*.

during the summer encouraged the growth of a lush vegetation. Fossilized plant remains show that forests of dawn redwoods and cypress, now restricted to more southerly latitudes, flourished in the Cretaceous Arctic.

Most of the dinosaur remains found in the Arctic have been those of juveniles. This supports a current theory that the hatchlings of plant-eating dinosaurs accompanied their parents in large herds on annual feeding migrations to the northern regions. Predatory dinosaurs most likely followed them. Larger dinosaurs probably turned south with the approach of winter. But some smaller species may have lived in the darkness of the polar winter, surviving by

becoming torpid or by feeding on the remaining vegetation.

Logistical support for the 1989 Dinosaur Project expedition was provided by the coordinating agency for the project, the Ex Terra Foundation (Edmonton) and logistical support in the Arctic was provided by the Polar Continental Shelf Project (Energy, Mines and Resources Canada, Ottawa). The expedition has improved our understanding of "The Age of Dinosaurs" in the High Arctic. We hope that more complete remains will be found in the future.

Richard Day
Paleobiology Division

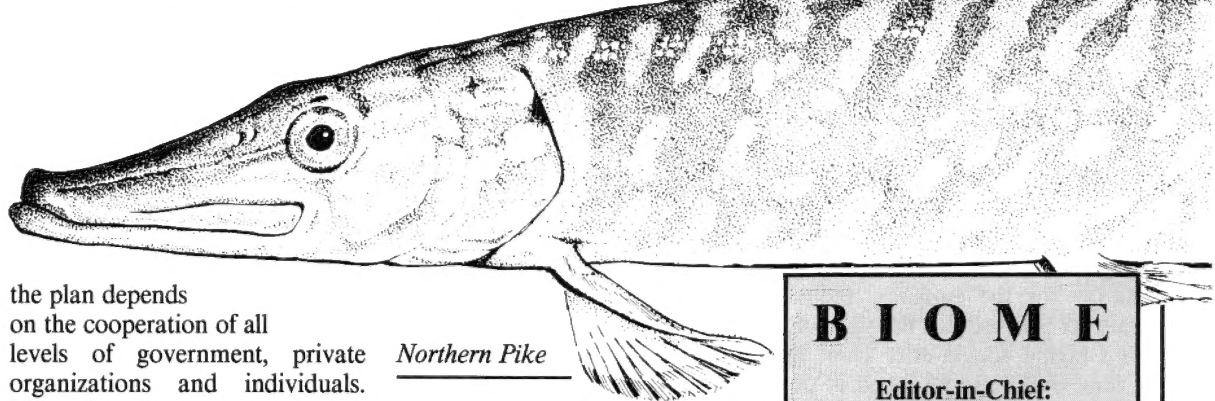
WETLANDS

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What is being done to protect wetlands?

In Canada, progress toward conserving wetlands has been slow, and has not been enough to save the best of Canada's remaining wetlands. But some notable steps have been taken. In 1981 the RAMSAR Convention was signed to protect wetlands of international significance. Seventeen sites have been designated in Canada, including Delta Marsh in Manitoba, Long Point and Point Pelee in Ontario, and Wood Buffalo National Park,

which straddles the border between Alberta and the Northwest Territories. In 1985 an annual conservation stamp was created, which duck hunters must buy when they purchase a Migratory Birds Hunting Permit. The proceeds from this stamp are used to secure wetlands and promote their protection. The most recent initiative, the 1986 signing of The North American Waterfowl Management Plan, promises to do much for wetlands conservation. This plan focuses on maintaining enough high-quality habitat to ensure an abundance of North American ducks, geese and swans throughout Canada and the United States. To reach its goal,



Northern Pike

the plan depends on the cooperation of all levels of government, private organizations and individuals. Throughout Canada, governments, naturalist groups, organizations such as Ducks Unlimited, and private citizens continue to make valuable contributions to wetlands conservation.

How can I help?

If you farm or ranch, ask your local agricultural representative, provincial wildlife department or the Canadian Wildlife Service for information on land-use management practices that you can incorporate into your operation to help preserve wetlands and benefit wildlife.

Get involved in projects that improve wildlife and fish habitats in wetlands, and organize or support community solutions to conflicts over wetlands.

If you are fortunate enough to own wetlands, protect them! If you don't, consider purchasing or

"adopting" abused wetlands and rehabilitating them.

Be a "wetlands watchdog": contact your local natural resources office if you see wetlands in danger.

Help educate your children and others in your community about the value of wetlands.

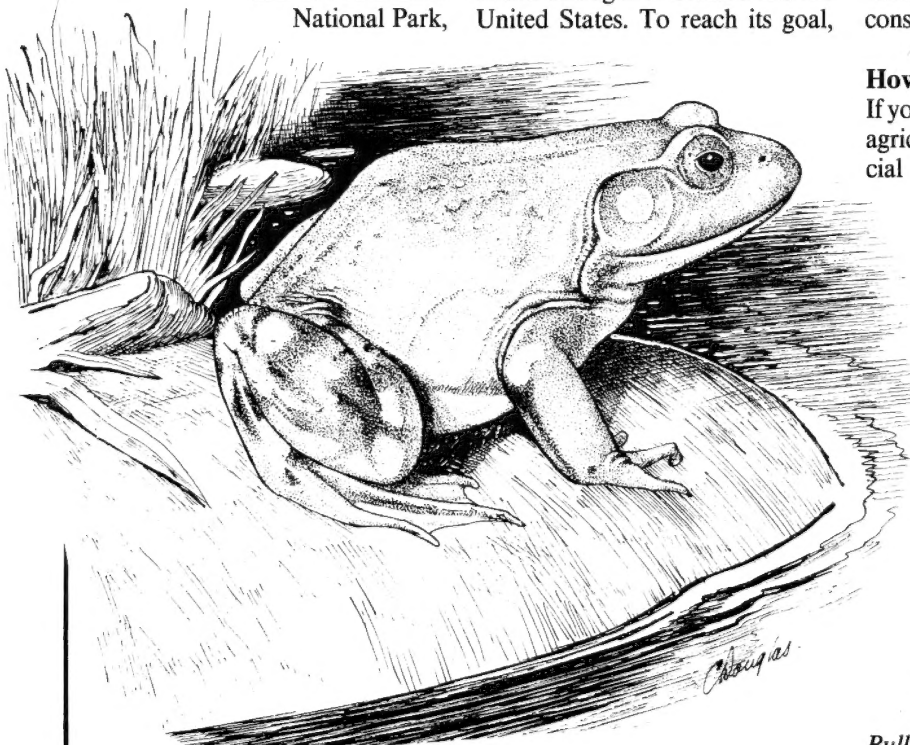
Make your municipal, provincial and federal representatives aware of the importance of wetlands and the need to protect them. Urge your local government to identify and protect the wetlands under its jurisdiction.

Purchase wildlife conservation stamps annually, whether or not you hunt. The proceeds are used to secure and protect wetlands.

Unlike their mythical descriptions, wetlands are wonderful, wild, watery and at times magical places. If these valuable natural ecosystems are to remain part of Canada's landscape in the 21st century and beyond, we must all help to conserve and protect them.

Jane Topping
Zoology Division

Bullfrog



BIOME

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Nick Bélanger

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John Crosby
Charles Douglas
Erich Haber

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Comments and questions
should be directed to:

BIOME
National Museum of
Natural Sciences
P.O. Box 3443
Station D
Ottawa, Ontario
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